

Rhodora

JOURNAL OF THE NEW ENGLAND BOTANICAL CLUB

Vol. 63

December, 1961

No. 756

VIOLA RAFINESQUII: NOMENCLATURE AND NATIVE STATUS

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The name *Viola bicolor* Pursh, Fl. Am. Sept. 1: 175, 1814 (Dec. 1813), was long rejected as a later homonym of *V. bicolor* Gilibert, Fl. Lithuanica 2: 123, 1782. It has been pointed out, however, that Gilibert used his own peculiar system of descriptive species names consisting of varying numbers of words (Hylander, 1945; McVaugh, 1949). That is to say, he used abbreviated polynomials, many of them short enough to simulate Linnaean binomials, but shown by their association with indubitable polynomials to be really the latter. Hence *V. bicolor* Gilibert does not invalidate *V. bicolor* Pursh, an authentic binomial. For this reason I employed the latter in my *Spring Flora of the Dallas-Fort Worth Area, Texas* (1958), and distributed specimens so named. Unfortunately there does exist a validly published homonym earlier than that of Pursh, not listed in Index Kewensis. This is *Viola bicolor* Hoffmann, Deutschlands Flora (ed. 2) p. 170, 1804. Though only briefly described incidentally to the account of *V. tricolor* L., the name is both valid and legitimate. Hence *V. Rafinesquii* Greene, Pittonia 4: 9, 1899, remains the correct name for the American plant if considered a species distinct from the European *V. Kitaibeliana* R. & S.

Fernald (1938) considered it so similar to the Old World species that he reduced it to varietal rank as *V. Kitaibeliana* var. *Rafinesquii*. But the morphological similarity is not the whole story. Breeding behavior (specifically, the occurrence of cleistogamy in *V. Rafinesquii* but not in *V. Kitaibeliana*)

and chromosome number (so far as known, from rather few counts) are different. Further, the question of nativity is intimately involved with taxonomic evaluation. For reasons to be detailed later, I believe that *V. Rafinesquii* is indigenous to North America, and that this gives additional support to its recognition as a species distinct from *V. Kitaibeliana*.

Two sources of evidence have been taken to indicate an Old-World origin for our plant. The first, its weedy behavior in the Atlantic States, must be rejected, since a number of field weeds in the East are immigrants, not from the Old World, but from areas farther west in North America. (This is more fully discussed below under item 2, Geography and Ecology.) The second, its close resemblance to members of the *V. Kitaibeliana* complex of southern and eastern Europe, is not at all as conclusive as Fernald (and Wilmott) found it. We have had a number of publications on the so-called amphigean or amphi-Atlantic members of the floras of northeastern North America and northwestern Europe. But our knowledge of the flora of the Southern United States, and more particularly its relationships with the Mediterranean and other floras, is in a primitive state. For the present one suggestive example must suffice. The small umbelliferous genus *Bifora* comprises two species in the Mediterranean region, one in Indo-China, and one in the United States (Texas, Oklahoma, Arkansas). The Mediterranean and American species are extremely similar in general appearance, though differing more markedly in technical morphological details than do *Viola Rafinesquii* and the *V. Kitaibeliana* complex. *Bifora americana* is annual and decidedly weedy. In North Central Texas it is a familiar late-spring wild flower, on "prairies, rocky slopes, and roadsides, limestone areas; very common, often abundant" (Shinners, 1958). In Dallas it is a common weed in vacant lots. It has also been found introduced as a roadside weed in Rusk County, Texas, about 100 miles east of its main range. Nevertheless its native status is beyond question. So close is the parallel with the *Viola Rafinesquii* — *V. Kitaibeliana* situation that the morphological similarities between the latter cannot be taken as proof of common nativity.

The sources of evidence in support of the nativity of *V.*

Rafinesquii in North America are more numerous. While no single one can be taken as conclusive beyond all question (owing in part to the incompleteness of our knowledge, especially of the cytology, breeding behavior, and microforms of *V. Kitaibeliana*), there is remarkable agreement among them. Taken together, I believe that they demonstrate that *Viola Rafinesquii* is a native American species. The arguments may be grouped under six overlapping and closely interrelated headings.

1. EARLY RECORDS. Fernald observed that the earliest record of this species was in 1739 in Gronovius's *Flora Virginica* (actually 1743, since it appeared in the addenda on p. 182 in part 2, published in the latter year). The brief description fits quite well, but there is no information as to exact locality, habitat, or abundance. Pursh, in describing it as *V. bicolor*, said only that it grew "in fields of Pennsylvania and Virginia." This sounds weedy enough, but a field recently cleared from wilderness, and still surrounded by wilderness, is a different thing from fields in the 20th Century. The importance of this point will appear in the discussion of geography and ecology (item 2, below). Barton (1818), treating the area within 10 miles of Philadelphia, reports its occurrence "on the grassy borders of cultivated fields bordering Cooper's creek, Jersey, not far from the Market-street ferry and the Burlington road." Nuttall (also in 1818), without specifying any localities, said "apparently native." Other early reports give stronger evidence of the plant's being native. Elliott (1817) says "Found near the Chatahouchie river, Creek nation, by Dr. Latham," far removed from cultivated fields. His predecessor in the area, Thomas Walter, remaining close to civilization, did not find it. Schweinitz, writing at Salem, North Carolina, in 1821, declared that "this interesting *Viola* grows with us, along the river bottoms and in retired mountain vallies in such a manner as to leave no doubt, that it is a true native." West of the Mississippi (where the plant is today and has long been far more abundant than to the east) there are likewise early testimonials in support of native status. Reverchon (1880) had no doubt of its being native in Dallas County, Texas. T. C. Porter (1880) quoted Reverchon and added

evidence of its natural occurrence in Colorado: "Mr. Reverchon, in the last number of the GAZETTE, reports it from Dallas county, Texas, and says, 'I am satisfied it is native. I have met it in large patches in remote woods and prairies, sometimes *very far* from settlements.' To this I may add the fact that it has also been collected in Colorado by Mr. Wm. A. Henry, who thus wrote me Aug. 29, 1876 — 'I send you more of the violet. It grows on a warm, dry slope at the mouth of Boulder canon, in a rather inaccessible place. I have seen a few stalks farther up the canon. It blooms very early, along with *Leucocrinum montanum*, so that it has probably escaped the notice of other collectors. I gathered it three years before in the same place. It *could* have been introduced, but I greatly doubt that seeds of recent introduction could have reached the spot where I found these plants.' " It was collected in Oklahoma ("Indian Territory") in 1875 (*Butler*, no other data; SMU). These early records do not support Fernald's belief that the plant was an introduction from Europe.

2. GEOGRAPHY AND ECOLOGY. Both the geographic area and weedy behavior of *Viola Rafinesquii* are strikingly like those of certain other species of unquestionably native status. *Bifora americana* has already been cited. *Mirabilis albida*, first described in Walter's *Flora Caroliniana*, is rare and local east of the Mississippi River, but common and widespread west of it, especially in Texas and Oklahoma. There it is distinctly weedy, appearing on roadsides, pastures, and old fields. There is an endemic var. *lata* in eastern Texas (Shinners, 1951). *Hedyotis nigricans*, first described from Florida, is abundant and weedy on limestone outcrops, disturbed prairies, and eroding ground in central Texas and Oklahoma, but in eastern Texas and Louisiana and in states farther east it is much less common. *Helenium amarum* (*H. tenuifolium*) early in the 19th Century occurred as far east as Mississippi. Gray's *Synoptical Flora* (1886) says "Arkansas to Mississippi, Florida, and Texas; becoming a naturalized weed throughout Southern Atlantic States." Undoubtedly its indigenous range centered in Texas, where (in strikingly resemblance to *Mirabilis albida*) there is an endemic var. *badium* (perhaps better treated as a distinct

species). I long ago reported instances of the same species occurring in the same general region in populations of two origins: one native, the other introduced. *Sporobolus neglectus* and *S. vaginiflorus* var. *inaequalis* are present in southern Wisconsin as very localized natives on rocky hillsides and, at the same time, as rapidly spreading railroad weeds largely introduced from elsewhere (Shinners, 1941). This I believe has been precisely the history of *Viola Rafinesquii*. Fernald's argument that because of its weedy behavior and habitats in the eastern states it must have been introduced from Europe cannot be accepted.

The occurrence of the plant in Colorado is not out of order for a native of the Gulf Southwest. *Thalictrum dasycarpum* var. *hypoglaucum*, ranging as far west as British Columbia and Arizona, occurs east to Missouri, Arkansas, and Louisiana (Boivin, 1944). In Texas it occurs only in the eastern third of the state, so that there is a very wide gap in its range. *Brickellia grandiflora*, a Rocky Mountain and Pacific species, is known from a few stations in Arkansas and Missouri (Robinson, 1917), a distribution pattern resembling that of *Viola Rafinesquii* in reverse. *Aster laevis*, a common species of the northeastern United States, also occurs in Colorado, but is absent from a large area in between. (In the northern Rocky Mountain region var. *laevis* is replaced by var. *Geyeri*.)

3. VARIATION. According to Wilmott (quoted by Fernald, 1938, p. 446), one of the major differences between *V. Rafinesquii* and *V. Kitaibeliana* was in the sepals: with strongly ciliate margin in the former, with little or no ciliation in the latter. In north-central Texas and eastern Oklahoma, *V. Rafinesquii* occasionally has completely glabrous sepals, and there are rare intermediates with sepals ciliate only in basal portion or very sparsely. Fernald evidently had insufficient material from this area, for he states that the ciliation is "essentially constant." I have seen specimens with entirely glabrous sepals from Logan, Love, Payne, and Pontotoc counties in Oklahoma, and from Wise County, Texas; with partially glabrous sepals from Cherokee and Delaware counties in Oklahoma, and from Wise County, Texas. It might at first be thought that this weakens the case for taxonomic

distinctness and native status of *V. Rafinesquii*. But there is a difference in sepal shape (see further under item 4, below), so that ciliation is not the only point of difference. The geographic distribution of the glabrous variants is, however, quite significant. If the plant were an alien which had first been introduced into the Atlantic states, one would not expect a minor variation to be thus restricted (though it is remotely possible). But if it is native, and in process of developing endemic races, that is precisely what one would expect. The occurrence of endemic varieties of *Mirabilis albida* and *Helenium amarum* within the Gulf Southwest, mentioned under item 2, are suggestive examples. I believe that, when taken in conjunction with the other items being cited as evidence of native status, the localized glabrous variants of *V. Rafinesquii* strengthen the case.

4. ABSENCE FROM THE OLD WORLD. Fernald and Wilmott were unable to match *V. Rafinesquii* with any forms in the *V. Kitaibeliana* complex. In checking through European floras, I found in Pereira Coutinho's *Flora de Portugal* (ed. 2, p. 500, 1939) *V. Kitaibeliana* var. *Machadiana*, described as "papiloso-aspera." Specimens of *V. Rafinesquii* were sent to A. R. Pinto de Silva of the National Agronomic Station at Sacavem, Portugal, with a request for an opinion as to whether they might be var. *Machadiana*. He very kindly took them to Lisbon (LISE) where, with the help of Dr. L. G. Sobrinho, they were compared with a paratype and other specimens determined by Coutinho. He reports (in letter of 23 December 1956) that "your *V. Rafinesquii* is different from *Machadiana* and that its original country cannot be Portugal." He found that the main differences were in the basal leaves (with ovate limb and the incisions of the crenate teeth more "opened" in *Machadiana*; with depressed-orbicular limb, the incisions of the crenate teeth not "opened" in *Rafinesquii*) and in the sepals (lanceolate, broader near the base but narrower, and glabrous at the margin or scarcely, sparsely and hispidly ciliate in the upper part and near the base in *Machadiana*; sepals constricted as a shoe and regularly hispidly and strongly ciliate in *Rafinesquii*). He adds "I have observed also some specimens of *V. Kitaibeliana* (determined as so!) from South Spain (Sierra Nevada)

(LISE). These have sepals with a little more cilia but they are still different from your *Rafinesquii*." The opinion of Fernald and Wilmott that *V. Rafinesquii* must be some very rare and local European race remains without proof.

5. CLEISTOGAMY. Gershoy (1934, p. 13) states briefly that only *V. Rafinesquii* in the sec. *Melanium* produces cleistogamous flowers. I have observed apparent cleistogamy in the species in northeastern Texas, but rarely. Color variations in roadside colonies suggest, however, that more careful observation might show it to be fairly common. Some colonies show considerable variation in flower color, while others — or certain patches within extensive stands — are perfectly uniform. This is what one might expect if the plants reproduce by both cross- and self-pollination. I have no information about the European members of the section beyond Gershoy's statement. He remarks that he considers *V. Rafinesquii* to be "functionally biennial"; as known to me, it is a winter annual. He considers the three forms of *V. Kitaibeliana* for which chromosome counts were made as annual.

6. CHROMOSOME NUMBER. For *V. Kitaibeliana*, Gershoy reports haploid numbers of 7, 18, and 24. For *V. Rafinesquii* he gives 17, but does not state the number of counts or source of material on which this figure was based. At my request, Dr. Walter H. Lewis of Stephen F. Austin State College, Nacogdoches, Texas, counted two plants growing wild on his campus and found the diploid number to be 34, thus confirming Gershoy's count for this species. Additional counts from different localities are needed, both in America and in Europe, before we can be reasonably certain that the same number is not found on both sides of the Atlantic, but the data so far available certainly fall into the same pattern as other lines of evidence.

It is concluded that *Viola Rafinesquii* is a native American plant with its major area in northeastern Texas, Oklahoma, and Arkansas, with outlying scattered stations farther east and in Colorado, that it has increased and spread as a weed since settlement, and that, although very similar to members of the *V. Kitaibeliana* complex of the Old World, it is preferably treated as a distinct species, the weak morphological

differences being supported by differences in breeding behavior and chromosome number, as well as by geographic remoteness.

I wish to express my very deep appreciation to A. R. Pinto de Silva for his great trouble in comparing specimens, making tracings and microfilms, and supplying transcripts of all the Portuguese literature dealing with the *Viola Kitaibeliana* group; to Dr. L. G. Sobrinho for his assistance in checking the material at Lisbon; to Dr. Walter H. Lewis for the chromosome counts of *V. Rafinesquii*; to Dr. U. T. Waterfall for the loan of specimens in the Herbarium of Oklahoma State University; and to Dr. G. B. Van Schaack, Librarian, Missouri Botanical Garden, for a copy of the original description of *V. bicolor* Hoffmann. — SOUTHERN METHODIST UNIVERSITY, DALLAS 22, TEXAS.

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THE GENUS OLEANDRA OF COSTA RICA

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This paper is the third of my studies of a genus of Costa Rican ferns, and follows the same plan as the previous ones on *Adiantum*¹ and *Pteris*.²

Again I want to express my gratitude to Dr. Leslie R. Holdridge of San José for his great help during my seasons of collecting in Costa Rica, and to Dr. Rolla M. Tryon of Harvard University for his advice and assistance so generously given in the preparation of these papers.

The drawings have been prepared especially for this article by Miss Ruth Hsu.

OLEANDRA Cavanilles

Oleandra is an isolated genus and is considered to be an old one. It is restricted almost entirely to the Tropics with numerous species in Asia to Polynesia, Africa, West Indies and Central and South America. The fronds are simple and entire, usually lanceolate-elliptical and firm, often lustrous in texture resembling the leaves of the Oleander, whence the name.

In some species the rhizome is stout (with appressed scales) and more or less erect, producing a shrubby growth habit. In others it is more slender (with spreading scales) and twines about tree trunks. The stipes are articulate (the portion below the joint being called a phyllopodium) and short or long, solitary or clustered. Veins are free (Fig. 3),

¹Contrib. Gray Herb. 187: 3-22. 1960.

²Rhodora 63: 194-205. 1961.